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Localities.—In the Marshall Sandstone, at Battle Creek, Liberty (Jackson county), Moscow, near Napoleon and at the Gritstone Quarries, at Pt. aux Barques, with *Rhynchonella camerifera*.

Besides the species already enumerated from the Marshall group there yet remain a few too imperfect for adequate description, or belonging to classes not yet investigated. Among these are *Lepidodendron* and *Neuropteris*?; a coralline structure, encrusting, foliaceous or branching, with minute, short, crowded polygonal cells .0088 of an inch in diameter, without visible lamellæ, but with some indications of transverse floors; some undetermined Lamellibranchs; two sorts of Chiton-like scales; two or three Nautili, of which one is nodulous; and sundry remains of spines, teeth and bones of fishes.

University of Michigan, July 1, 1862.

Synopsis of the CARANGOIDS of the Eastern Coast of North America.

BY THEODORE GILL.

In the preparation of the "Catalogue of the Fishes of the Eastern Coast of North America," I trusted almost wholly to previous naturalists for that portion relating to the species of Scombroids and the allied groups. Drs. Dekay, Holbrook and Girard having each introduced supposed new forms, it was to be presumed that they had studied the species in their various stages. My attention having been since attracted especially to the Carangoids, it has been discovered that the nomenclature of several was quite erroneous and that some genera and species had been founded on young individuals of previously named forms. The preoperculum in early youth, as far as known, is armed with three stout spines at the angle and smaller ones above and below, the spinous dorsal is always developed at that period, and teeth are also present. At a later period the spines of the preoperculum are absorbed in the margin, while in some types the first dorsal becomes atrophied and is, in several, represented by free and simple projecting spines, and at a still later period the teeth are likewise lost. A single species of one such type (*Trachynotus*) has served at different stages of growth as a representative of three different genera, characterized by the condition of the spinous dorsal and the dentition.

The following table will enable the student to distinguish the several groups. Although the genus *Pomatomus* Lac. (*Temnodon* Cuv.), is here retained in the family, I am not certain that it truly belongs to it.

The object of the present article is to correct the nomenclature of several species, as well as to draw attention to the imperfection of our information regarding several others, especially the species of the subfamily of *Centronotinae*. No one will deny that it is for the interest of science that the nomenclature of the genera and species of animals shall be settled as soon as possible, and it is hoped that the present communication will contribute to that desirable end as far as the American species of Carangoids are concerned. Much, however, yet remains to be done. Although I have seen all the species enumerated, with one exception,* specimens, from the eastern coast, of several are not represented in the collection of the Smithsonian Institution. Those desired species are the following:—*Decapterus punctatus*, *Carangus fallax*, *Blepharichthys crinitus*, *Trachynotus glaucus*, *Naucrates ductor*, *Zonichthys fasciatus* (young), and *H. boscii*. It is hoped that such deficiencies may be soon remedied.

* *Halatractus boscii*.

- I. Lateral line behind straight and even with the axis.
- A. Lateral line more or less protected by larger plates.... CARANGINÆ.
 - B. Body oblong or elongated; spinous dorsal developed.
 - C. Body perfectly fusiform; snout above axis,
 - 1. Spurious dorsal (1) and anal (1) finlets..... Decapterus.
 - 2. Spurious finlets none..... Trachurops.
 - CC. Body unequally developed with regard to axis, the dorso-rostral outline being disproportionately decurved.
 - α. Head moderate; suborbital bones moderately elevated (=eye); teeth of jaws enlarged in outer row.
 - Body subfusiform; canine teeth none in front of lower jaw..... Paratractus.
 - Body oblong; canine teeth (2) in front of lower jaw..... Carangus.
 - β. Head small; suborbital bones very low; teeth of jaws villiform..... Carangops.
 - BB. Body rhomboid; spinous dorsal rudimentary in adult..... Blepharichthys.
 - AA. Lateral line unarmed.
 - B. Body exceedingly compressed and elevated; profile very oblique or subvertical..... VOMERINÆ.
 - α. Body oblong; abdominal outline very convex in youth; dorsal and anal fins nearly uniform..... Vomer.
 - β. Body obliquely elevated, pentagonal; dorsal and anal fins falciform.
 - 1. Ventral fins very short..... Selene.
 - 2. Ventral fins very long..... Argyriosus.
 - BB. Body much compressed, with the inferior outline trenchant; profile oblique and rectilinear; anus behind ventral fins..... CHLOROSCOMBRINÆ.
Chloroscombrus.
 - BBB. Body less compressed, with the abdomen transversely convex. Anus submedian or posterior.
 - α. Abdomen considerably shorter than the anal fin, which nearly equals the second dorsal..... TRACHYNOTINÆ.
Trachynotus.
 - β. Abdomen nearly equal to the anal fin, which is much shorter than the second dorsal..... CENTRONOTINÆ.
 - Spinous dorsal represented by short and free spines in adult..... Naucrates.
 - Spinous dorsal well developed.
 - Head high..... Zonichthys.
 - Head oblong..... Halatractus.
 - II. Lateral line behind scarcely straight or even with the axis, but rather above..... POMATOMINÆ.

CARANGINÆ (Bon.) Gill.

Genus DECAPTERUS Bleeker.

DECAPTERUS PUNCTATUS Gill.

Scomber hippos *Mitchill* (nec Linn.).*Caranx punctatus* *Agassiz, Cuv. et Val.*

This species appears to be a very rare and occasional straggler to the Northern
1862.]

Seas. No individuals from the United States are in the collection of the Smithsonian Institution. It has only been noticed on our coast as a straggler to New York.

Genus TRACHUROPS Gill.

TRACHUROPS CRUMENOPHTHALMUS Gill.

Scomber crumenophthalmus Bloch.

" *balantiophthalmus* Bloch, Schneider.

" *plumieri* Bloch.

Caranx crumenophthalmus Lacépède.

" *daubentonii* Lacépède.

" *plumieri* Cuv. et Val.

" *macrophthalmus* Agassiz.

A single specimen of this species was found at Beesley's Point, New Jersey, among a school of blue fish (*Pomatomus saltatrix*), by Prof. Baird.

The specific name and the reference of the African and American forms to one species is given solely on the authority of Günther, no specimens of the foreign forms being at present accessible to me. The Pacific representative or Red Sea representative appears to be distinguished by its more slender body and shorter head.

Genus PARATRACTUS Gill.

This genus embraces three of the species known which have been referred to *Caranx*. Besides the type, the *Caranx fusus*, of Geoffroy,* and the *Trachurus boops*, of Girard,† belong to it.

PARATRACTUS PISQUETUS Gill.

Caranx pisquetos Cuv. et Val.

" *chrysos* Dekay (nec *Scomber chrysos*, Mit.)

" *hippos* Holbrook (nec *Scomber hippos*, Linn.)

Trachurus squamosus Gronov., post.

Carangus chrysos Girard.

" *hippos* Gill.

This species was first considered by Dekay to be identical with the *Scomber chrysos*, of Mitchill, whose specific name was consequently adopted. He has been followed in this identification by all subsequent writers. Such an identification is evidently erroneous, as Mitchill expressly describes his species as having the "length six inches and a half; depth two." The height is therefore contained three times and a sixth ($3\frac{1}{6}$) in the length,‡ proportions which are fully corroborated by the figure. It is probable that authors have been misled by the radial formula of Mitchill, which gives a larger number of rays than is usually found in the species to which it really belongs.

Holbrook has also identified this species with the *Scomber hippos*, of Linnaeus.§ This reference is likewise evidently erroneous, as Linnaeus especially attributes two larger teeth in the front of the jaw, while in the present species such teeth are not developed.

The name given by Cuvier and Valenciennes being the first properly applicable to the species, it must be adopted.

* Geoffroy St. Hilaire, in *Description de Egypte; Histoire Naturelle*, pl. 24, fig. 3, (1809—13.)

† Girard, *Surveys and Explorations for a Railroad Route to the Pacific*, vol. x. Fishes, p. 108 (1859.)

‡ The height of *Caranx pisquetus* is contained $3\frac{1}{6}$ — $3\frac{1}{2}$ times in the length; this species is, therefore, much more slender than Mitchill's fish.

§ Holbrook erroneously considers the present species to be also identical with the *Caranx chrysos* of Cuvier and Valenciennes.

The *Paratractus pisquetus* is the most common of the tribe at the North, and is found along the whole Eastern Coast as far north as Massachusetts.

Genus CARANGUS Girard.

Caranx Bleeker.

I have adopted Girard's name for this genus in the "Catalogue of the Fishes of the Eastern Coast," but afterwards, in deference to Bleeker, would have accepted in its place the name of *Caranx*, as applied by that gentleman. I now feel compelled to return to my original position and retain the name of *Carangus* for the present, while that of *Caranx* is preserved for the *Caranx speciosus* of Lacépède.* Less confusion, I believe, will result from this circumscription than from any other, and appears to be fully justified by circumstances.

Lacépède first applied the name of *Caranx* to a group which he distinguished from *Scomber* on account of the absence of the dorsal and anal finlets. He has in the preliminary remarks acknowledged that he adopted the name from Commerson, and has observed that the appellation was derived from the Greek *καρπα*, and given in allusion to the prominent head.† Of the genus thus derived from Commerson only one species seems to have been known to that naturalist. That species is the *Scomber speciosus* of Linnæus, or the *Caranx speciosus* of Lacépède. The idea conveyed by the name of *Caranx* is well associated with the fish. As the name of *Caranx* was therefore first framed for that species by Commerson, and as Lacépède, by virtue of his preliminary remarks, adopted the genus as Commerson's, the name must be retained for that natural genus, of which the *Caranx speciosus* is a representative. Bleeker's name of *Gnathanodon* applied to it, appropriate as it is, must be then considered as a synonym.

The genus to which Bleeker applied the name of *Caranx* being thus deprived of that name, the one latinised by Girard from the designation which Cuvier had conferred on it as a group may be adopted.‡

The genus as now limited will only embrace three species found on the eastern coast of the United States. Those species are distinguished by the following relative characters:—

- I. Body rather oblong, with the snout very convex; dorsal spines seven; pectoral fins with a distinct spot *C. hippos*.
- II. Body convex above and with the front less obliquely decurved; dorsal spines eight; pectoral fins not spotted.
 - α. Breast scaly. Opercular spot obsolete *C. fallax*.
 - β. Breast naked. Opercular spot distinct *C. chrysos*.

CARANGUS FALLAX Girard.

Guara tereba Marcgrave.

Caranx fallax Cuv. et Val.

Caranx richardii Holbrook.

Caranx hippos Günther, (nec *Scomber hippos* Linn.; nec *Caranx hippos* Holbrook).

* The *Caranx speciosus* is the type of the genus *Gnathanodon*, of Bleeker.

† Nous leur avons conservé le nom générique de *Caranx*, qui leur a été donné par Commerson, et qui vient du mot Grec *καρπα* lequel signifie tête. Ce voyageur les a nommés ainsi à cause de l'espèce de prominence que présente leur tête, de la force de cette partie, de l'éclat dont elle brille, et d'ailleurs pour annoncer la sorte de puissance et de domination que plusieurs osseux de ce genre exercent sur un grand nombre de poissons qui fréquentent les rivages.

‡ It is probable that Rafinesque has framed a name for this genus, as Lacépède placed its type as the first of an anonymous subgenus, and in accordance with his system, that confounder of nomenclature has doubtless conferred on it a generic name. I am unable at present to examine his early works.

The only evidence of the existence of this species on the eastern coast is a figure of a fish, taken near Charleston, executed by Mr. Richard, a Zoological artist. The fish itself was afterwards lost, but not until after the figure had been completed from it. On the authority of this figure, Dr. Holbrook has considered the species as undescribed, supposing it to be distinguishable from the "*Caranx fallax*" by the want of the "dark color of the anterior rays of the second dorsal fin." Even if the color of that fin was as light as represented in the figure, it would not indicate a specific difference from that species, and consequently the name must be referred, for the present at least, to such species with which it agrees, according to the figure, by its scaly breast and absence of an opercular spot. Dr. Günther* has referred the name to the synonymy of *Carangus chrysos* (*Caranx carangus*), but as it disagrees with that species in the same respect as it agrees with *C. fallax*, the accuracy of that reference is very questionable. My personal knowledge of the artist by whom the figure was made induces me to confide in the correctness of his drawing.

CARANGUS HIPPOS Gill.

Caranx erythrorus Lac.

Caranx carangus pt. Cuv. et Val.

" *defensor* Dekay.

Carangus defensor Girard.

This species is well distinguished among its relations by its straighter back, the more obliquely convex profile, the seven spines of the dorsal fin, and the spot on the inferior portion of the pectoral fin. The first notice that can be positively referred to this species alone is the description and figure by Dekay of the *Caranx defensor*. There can, however, be little doubt that Linnæus had it in view in his *Scomber hippos*.

The *Carangus defensor* is found along the eastern coast from New York southwards.

The brief notice given by Linnæus of the *Scomber hippos*,† sent to him by Garden from Charleston, South Carolina, is more applicable to this species than to any other found on the coast. It has nevertheless been referred to three others, the *Decapterus punctatus*, *Carangus fallax* and the *Paratractus pisquetus* of the present memoir.

The reference to the two large front teeth of the jaw at once excludes the *Paratractus*.

The notice of the opercular spot forbids the reference of the name to the *Caranx fallax*.

With regard to its application to the *Caranx carangus*, or the *C. defensor*, there is more uncertainty. The Linnæan diagnosis contains no allusion to a pectoral spot, a character so prominent that it should scarcely have been left unnoticed if it had existed, but as the number of dorsal spines, as given by Linnæus, corresponds with the number found in *Carangus defensor*, the name of *Carangus hippos* is, therefore, accepted as the proper name for the present species.

CARANGUS CHRYSOS Gill.

Scomber carangus Bloch.

* Günther, Catalogue of the Acanthopterygian Fishes, vol. ii. p. 448.

† The description left by Linnæus is the following:—

S. hippos pinnulis unitis, operculis postice macula nigra.

B. 7. D. 7, 22. P. 22. V. 6. A. —. C. 30.

Habitat in Carolina, Dr. Garden.

Dentes unica serie; anticus 2 majoribus. Linea lateralis in medio valde declinata, postice carinata subspinosa. P. dorsalis posterior rubra. Ventralis analisque luteæ. Spinæ ante. Analem remotæ.

Caranx carangua Lac.

Scomber chrysos Mitchell (nec *Caranx chrysos* Dekay et al.).

Caranx carangus Cuv. et Val.

" *antillarum* Bennett (fide Günther).

Trachurus cordyla Gronov. (fide Günther).

Carangus esculentus Girard.

The *Scomber carangus*, of Bloch, is identical with the *Scomber chrysos*, of Mitchell, as is readily seen on the examination of his figure. The length of *Scomber chrysos* is said to be "six inches and a half; depth two;" the height would thus be contained three times and a sixth in the length, proportions which are corroborated, or represented as at least equally great, by the figure accompanying Mitchell's memoir. The only species living on the coast of the more temperate United States which exhibit those proportions are the *Caranx carangus*, of Cuv. et Val., and the *Caranx fallax*, of Cuv. et Val.

There is said to be "a black spot frequently at the edge of the gill cover;" this portion of the description thus excludes the *Caranx fallax*.

Mitchill further adds that there are "no zones, stripes, or spots any where about him;" the opercular spot is, of course, to be excepted. This denial of other spots additionally excludes the more oblong *Caranx defensor*, of Dekay, which has a distinct pectoral blotch.

The only plausible objection that can be urged against the preceding identification is the number of rays in the second dorsal, which is said to be "24" (= I. 23), while in the *Caranx carangus* that number is exceptional, but as it is possibly occasionally found, the objection on that score may even be untenable.* It is in any case certain that no species, except the *Caranx pisquetos*, of Cuv. et Val., has normally the number of rays assigned to the dorsal fin of the *Scomber chrysos*,† and it is equally evident that those latter two are not identical when the difference of form and the number of anal rays is taken into consideration. As the description and figure of the *Scomber chrysos* are therefore most applicable to the *Caranx carangus*, of Cuvier,‡ the two species must be considered as referrible to one species, for which the name of *Carangus chrysos* may be accepted.

Two Virginian specimens of *Carangus hippos* are in the Smithsonian collection, one of which was presented by Commodore Farragut, and the other by Dr. Jeffries, both having been obtained at Norfolk. It has also been observed at New York and South Carolina.

Genus CARANGOPS Gill.§

CARANGOPS FALCATUS Gill.

Caranx falcatus Holbrook.

* I have myself counted the dorsal rays of twenty individuals of the *Caranx carangus* and have found twenty soft rays in twelve specimens, twenty-one in seven, and twenty-two in a single one. No other scientific ichthyologist has assigned a larger number than the last to the species, and it is possible that the number given by Mitchell may be due to a typographical error, or that he has counted the last double ray as two.

† To those who may discover that Holbrook attributes twenty-three soft rays to the dorsal fin of *Caranx defensor*, I need simply refer to Holbrook's own figure, which represents twenty, and to Dekay's description which assigns the same number, which I have likewise verified on the two in the Smithsonian collection, besides others seen elsewhere. That number seems indeed to be almost constant. It is quite possible that Mitchell, who was by no means exempt from errors, may have made a similar mistake.

‡ The *Caranx fallax*, with the operculum spotless, has not yet been ascertained to have wandered further north than Charleston.

§ When proposing this name I was perfectly well aware that an extinct genus of fishes had been called *Carangopsis* by Agassiz, but I applied the name of *Carangops* to the present genus as the two appeared to me to be quite distinct enough to prevent confusion.

Carangus falcatus Girard, Gill.

Caranx amblyrhynchus pt. Günther.

This species has been considered by Günther as identical with the *Carangops amblyrhynchus* (*Caranx amblyrhynchus* Cuv. et Val.), of the Brazilian Coast, but if the proportions of the two forms are constant, such cannot be the case. The *Carangops amblyrhynchus* is described and figured by Cuvier and Valenciennes as a higher fish with a larger head. The height of that fish is contained two times and two-thirds in the total length, or about twice (fide figure) in the length to the base of the external caudal rays, while in *C. falcatus* the height is rather less than a third of the length, or a line twice the height would cease some distance before the end of the vertical fins. Thus even if the caudal fin of *C. amblyrhynchus* is unequal—which is denied by the figure and not noticed in the description—the *C. falcatus* is distinguishable from it.

Only known in the United States as an inhabitant of Charleston.

Genus BLEPHARICHTHYS Gill.

Blepharis Cuvier.

The name of *Blepharis* cannot be retained for this group of Carangoids as it had previously been bestowed on a valid genus of plants by Jussieu.

BLEPHARICHTHYS CRINITUS Gill.

Zeus crinitus Akerly.

Blepharis major Cuv. et Val.

“ *sutor* Cuv. et Val.

“ *crinitus* Dekay.

This species is rare along the eastern coast, no specimens from that coast being in the Smithsonian collection. It has hitherto been seen at New York.

Subfamily VOMERINÆ Gill.

Genus VOMER Cuv.

Platysomus Swainson.

VOMER SETIPINNIS Ayres.

Silver-fish Funnell.

Rhomboida Brown.

Poisson lune Desmarchais.

Zeus setipinnis Mitchill.

Vomer brownii Cuv. et Val.

Platysomus brownii Swains.

“ *spixii* Swains.

“ *micropteryx* Swains.

Argyreiosus setipinnis Gthr.

Young.

Argyreiosus unimaculatus Batcheler.

“ *vomer* (young? an spec nov.?) Gthr.

The young of this species has the abdomen much curved and extended downwards, and a spot at the commencement of the lateral line. This discovery, made last winter and communicated to several American ichthyologists, has been recently confirmed by the independent observations of M. Poey.

The number of dorsal rays is almost always twenty-one or two; the variety B with twenty-five rays, noticed by Dr. Günther, is therefore a distinct species, and may be named *Vomer dorsalis*.

Genus SELENE Lacépède, Brevoort.

SELENE ARGENTEA Lacépède.

Selene argentea Lac., Cuvier (1817). Stark (1818). Brevoort 1851-53). Gill. (1861). Poey (1861).

[Sept.

Zeus geometricus *Mitchill* (1818).
Argyreus vomer *Agassiz* (1828, Syn. excl.) *Cuvier* (1829). *Cuv. et Val.*
 (1833). *Günther* (1860) desc. excl.
Selene argentata *Mindling* (1832).
Argyreus triacanthus *Swainson* (1839).
 " *mauriceii* *Swainson* (1839).
 " *spixii* *Castlenau*.

This species which has been so singularly unfortunate in its nomenclature was first identified in nature by Mr. Brevoort, who published an excellent description and figure of it eleven years ago, which should have presented further confusion; it has nevertheless been overlooked, and the species has been since by one author described as new, and by another been referred to the *Argyrios vomer*. It has been only noticed on the eastern coast at New York.

Genus ARGYRIOSUS Lacépède.

ARGYRIOSUS VOMER Lac.

Zeus vomer *Linn.*

" *niger* *Bloch.*

" *rostratus* *Mitchill.*

Argyrios setifer *Swainson.*

Found along the entire eastern coast south of Cape Cod.

ARGYRIOSUS CAPILLARIS Dekay.

Zeus capillaris *Mitchill.*

Argyreus mitchilli *Dekay.*

This species is readily distinguished by the filamentous prolongation of the third, as well as second, dorsal spine. Its range appears to be co-extensive with the foregoing.

Subfamily CHLOROSCOMBRINÆ Gill.

Genus CHLOROSCOMBRUS, Girard.

Micropteryx *Agassiz* (nec Zeller).

CHLOROSCOMBRUS CHRYSURUS, Gill.

Scomber chrysurus *Linn.*

Scomber chloris *Bloch.*

Micropteryx cosmopolita *Agassiz.*

Seriola cosmopolita *Cuv. et Val.*

Scomber latus *Gronov.*

Chloroscombrus cosmopolita *Girard.*

Chloroscombrus caribbaeus *Girard.*

This species differs considerably in the vertical extension of the body with age, it being much higher when young than when fully grown.

Subfamily TRACHYNOTINÆ Gill.

TRACHYNOTUS (Lac.) Cuv.

Trachinotus *Lac.*, (*Trachynotus ovatus*).

Caesiomorus *Lac.*, (*Trachynotus bailloni*).

Acanthinion *Lac.*, (*Trachynotus ovatus*).

Baillonus Rafinesque (*Trachynotus bailloni*)*.

Bothrolæmus *Holbrook.*

Doliodon *Girard.*

* *Rafinesque* *Analyse de la Nature*. This work is not at present accessible, but the name *Baillonus* was doubtless introduced for the *Caesiomorus bailloni* of Lacépède. 1862.]

Cantor* and Bleeker† first noticed the changes the species of this genus undergo with age, while Günther, applying this knowledge to the re-arrangement of the entire genus, has reduced the twenty-two species of that genus admitted by Cuvier and Valenciennes to ten, and even of that number, two could not be distinguished by the descriptions published, and were considered doubtful. Ten of the specific names of Cuvier and Valenciennes have been referred to one species (*Trachynotus ovatus* Gthr.), but it is possible that two species may hereafter be recognized among them.

The four species and three genera of Trachynotinæ admitted among the fishes of the Eastern coast of the United States, are reducible to two species of a single genus, but as a genuine species must be added to the list, three species are again to be distinguished which may be recognized by the following characters.

- I. Body rhomboid, very elevated, about twice as long as high.
 D. VI. I. 18-21. A. II. I. 16-19..... T. OVATUS.
 II. Body oblong, 3 to 3½ times as long as high.
 α. Sides with four blackish linear bands. D. VI. I. 19. A.
 II. I. 17..... T. GLAUCUS.
 β. Sides uniform, silvery. D. V-VI. I. 24-26. A. II. I.
 21-24..... T. CAROLINUS.

TRACHYNOTUS OVATUS Günther.

Gasterosteus ovatus Linn.

Centronotus ovalis Lac.

Chaetodon rhomboides Bloch.

Acanthinion rhomboides Lac.

The Spinous Dory Mitchill.

Zeus spinosus Mitchill.

Trachinotus rhomboides Cuv. et Val.

“ *fuscus* Cuv. et Val.

“ *teraia* Cuv. et Val.

“ *spinosus* Cuv. et Val.

Lichia spinosa Baird.

Doliodon spinosus Girard.

This species is less common along the eastern coast than the *Trachynotus carolinus*.

The synonymy above given includes only the names bestowed on the American specimens,‡ as it is not yet quite evident that the American and Asiatic forms belong to the same species.

TRACHYNOTUS GLAUCUS Cuv. et Val.

Chaetodon glaucus Bloch.

Acanthinion glaucum Lac.

Trachinotus glaucus Cuv. et Val.

The species has been recently introduced into the Fauna of the United States by Dr. Holbrook, by whom it was discovered at Charleston, South Carolina. The latter is the only State in the Union along whose coast its occurrence has yet been commemorated by a naturalist.

TRACHYNOTUS CAROLINUS Gill.

Gasterosteus carolinus Linn.

Centronotus carolinus Lac.

Trachinotus pampanus Cuv. et Val.

* Cantor, Catalogue of Malayan Fishes, p. 121, 1850.

† Bleeker, Verhandelingen van het Bataviaasch Genootschap deel xxiv. Bydrage tot de Kennis der Makreelachtige Visschen, p. 48, 1852.

‡ The habitat of the *Gasterosteus ovatus* has not been mentioned by Linnæus.

Trachinotus argenteus Cuv. et Val., Gill.

Trachinotus cupreus Cuv. et Val.

Lichia carolina Dekay.

Bothrolaemus pampanus Holb., Gill.

Doliodon carolinus Girard, Gill.

In the "General Remarks" on this species, Dr. Holbrook, referring to Dekay's name for this species (*Lichia carolina*), has remarked that the absence of teeth forbids its reference to the genus *Lichia*; "nor can his specific name be retained, as that of Cuvier and Valenciennes has the right of priority; unless, indeed, it could be satisfactorily proved that our *crevalle* is identical with the *Gasterosteus carolinus* of Linnæus, and this cannot be done, as that animal must be a caranx, it having a carina along its tail. Yet it is almost certain that the *crevalle* of Dr. Garden, which Linnæus quotes as a *synonym*, is the animal now under consideration; for the name *crevalle* or *cavalli* was commonly applied to this fish, even in the time of Garden, as I have been informed by his contemporaries, and if we consider the great estimation in which this fish is held by epicures, and the price it commands in market above all others, it is not probable that its name has been changed."*

Linnæus gives the following description of his *Gasterosteus carolinus*.

GASTEROSTEUS CAROLINUS, spinis dorsalibus 8, analibus 3,

$\begin{matrix} 8 & & 3 \\ D. - 26. P. 18, V. 5. A. - & (= 27-3 = III. 24). & C. 27. \\ 8 & & 27 \end{matrix}$

Corpus oblongo-ovatum. Linea lateralis recta ad caudam subcarinata. P. D. and A. falcata. Cauda bifurca. Habitat in Carolina ubi *Crevalle* dicitur.

It is scarcely necessary to argue that this description can not be applied to any Carangine fish of the American or any other coast, as the existence of free spines instead of a dorsal fin,† straight course of the lateral line, its want of armature‡ and the radial formula at once render evident.

In all respects in which it thus differs from the Caranginae, it agrees with the *Trachynotus pampanus* of Cuvier,§ and more or less disagrees with any other known species. These characters as well as the immediate approximation of the species to one admitted to be a *Trachynotus* (*G. ovatus*) and the popular name and habitat assigned to it, render it certain that the *Gasterosteus carolinus* is the *Trachynotus pampanus* C. V., and the *Bothrolaemus pampanus* of Holbrook, and that the species must be consequently called *Trachynotus carolinus*.

Blindly confiding in the accuracy and knowledge of my predecessors, and neglecting to question Nature herself, I have in the Catalogue of the Fishes of this coast, admitted the four nominal species distributed among the genera by implication admitted by them. The characters of the several genera and

* Holbrook, Ichthyology of South Carolina, p. 84, 1855.

† This character is of course implied by the reference of the species to the genus *Gasterosteus*.

‡ Linnæus knew two species of the genus *Caranx* as understood by Cuvier. Of one of these (*Caranx trachurus*) the lateral line was said to be mailed (*Linea lateralis loricata*) and of the other (*Carangus hippos*), carinated and subspinose (*Linea lateralis carinata, subspinosa*). The curvature of each was also noticed. The phrase "*subcarinata*," was therefore evidently not intended to describe the lateral line of a *Caranx*, but to indicate the distinctness of the line of the species to which the name of *Gasterosteus carolinus* is here referred.

§ I have found the same large number of dorsal and anal rays as that noticed by Linnæus. ($\begin{matrix} 8 & & 3 \\ D. - 26. A. - & (= D. VII. I. 26. A. II. I. 24), & \end{matrix}$ although such a number is of rare occurrence.

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species, as understood from the examination alone of the literature of the science, are indicated in the following synopsis.

I. Teeth developed.

α. Spinous dorsal developed..... Doliodon.

β. Spinous dorsal replaced by free spines..... Trachynotus.

II. Teeth of jaws and pharyngeal bones absent. Dorsal spines

free..... Bothrolæmus.

The two species of Doliodon were distinguished by their height and the number of rays, and are really distinct. One of them, however, also appeared under two other genera. The differences above signalized are the result of age.

When extremely young, the preoperculum is armed at the angle with three large spines, and smaller ones above and below. The spinous dorsal is developed as a perfect fin, and teeth are present on the jaws and palatine arch. In this stage the species has never been described by previous naturalists, and consequently has received no name as the corresponding stage of Naucrates* has.

At an early period, the preopercular spines are absorbed in the substance of the preoperculum and disappear. The spinous dorsal and the teeth are still retained. In this condition it remains for some time; the spinous dorsal, however, gradually losing its relative size, while the soft vertical fins increase. In this stage the species belongs to the genus Doliodon of Girard.†

At a later period, the membrane connecting the dorsal spines has become obsolete, and the species then represents the genus Trachynotus as understood by Cuvier and Valenciennes and others.

Finally, in old age the teeth of the jaws, palate and pharyngeal bones have fallen out, and the lobes of the dorsal, anal and caudal fins attained their greatest extension and become pointed. This final stage has been made known by Holbrook under the new generic name of Bothrolæmus.

The various differences in the development of the soft fins and the dentition were correctly appreciated by Günther, and the several names have been referred to the synonymy of the species to which all belong.

It is a rather singular coincidence that Linnæus has found the same number of rays in his *Gasterosteus saltatrix* which is the *Pomatomus saltatrix* of the present article, as in the *G. ovatus*, and this identity of the radial formulæ has induced Schneider to unite the two species which belong to at least different subfamilies.‡

Subfamily CENTRONOTINÆ Gill.

Genus NAUCRATES (Raf.) Cuv.

Seriola sp. Cuv. et Val.

Nauclerus Cuv. et Val.

NAUCRATES DUCTOR (Raf.)

Adult.

Gasterosteus ductor Linn.

Gasterosteus antecessor, Daldorf.

Scomber ductor Bloch.

“ *koelreuteri* Bloch.

Centronotus conductor Lacépède.

Naucrates fanfarus Raf.

“ *ductor* Cuv. et Val.

* The genus *Nauclerus* corresponding to this stage of *Naucrates* was proposed by Cuvier, and has been unreservedly adopted by every succeeding naturalist.

† The corresponding stage of *Naucrates* has been observed by Cuvier and Valenciennes, and made known under the names of *Seriola duseumieri* and *S. succincta*. These species have been adopted by their successors.

‡ See *Histoire Naturelle des Poissons*, tome ix. p. 229.

Naucrates noveboracensis Cuv. et Val.

“ *indicus* Cuv. et Val.

“ *koelreuteri* Cuv. et Val.

“ *ductor* Swainson.

“ *cyanophrys* Swains.

“ *serratus* Swains.

Thynnus pompilus Gronov. (Gray ed.)

Young with dorsal spines connected.

Seriola dussumieri Cuv. et Val.

“ *succincta* Cuv. et Val.

Young with spinous dorsal fin and preopercular spines.

Nauclerus compressus Cuv. et Val.

“ *abbreviatus* Cuv. et Val.

“ *brachycentrus* Cuv. et Val.

“ *triacanthus* Cuv. et Val.

“ *annularis* Cuv. et Val.

“ *leucurus* Cuv. et Val.

The above synonymy has been given on the authority of Dr. Günther as far as the union of the forms described under the generic name of *Naucrates* are concerned; the *Seriola* and *Naucleri* added to it are young fishes of this genus, and if all the forms referred to *Naucrates* belong to one species, the *Seriola* and *Naucleri* are doubtless the young of that single species. Much doubt is however entertained as to the correctness of this union of so many species. If aught may be judged from the examination of single specimens, the species of the Mediterranean sea differs from a Pacific one* of nearly the same size, by the higher body, the shorter head, the smaller eye, the ecarinate forehead, and especially the breadth of the lingual band of teeth, which is about three times as broad and extends farther forwards than in the Pacific specimen.† The vomerine patch is also wider and shorter, as well as blunt behind, and the tongue is shorter. Differences like these cannot in this case be well attributed to age or condition, and are apparently specific. But as Cuvier and Valenciennes have not made use of these characters, but distinguished their species on the most trivial grounds, and as Günther, with much better opportunities than those enjoyed by me, has considered them all identical, I provisionally accept his synonymy, until we may better know the value of the character referred to. There can at least be scarcely any doubt that there is only one *Naucrates* on the eastern coast of America, as the difference of color on account of which the *N. noveboracensis* has been distinguished from *N. ductor*, is, as Cuvier and Valenciennes have themselves suggested, the result of alteration by liquor.‡

No specimen of *Naucrates* from the United States is in the Smithsonian collection.

Genus ZONICHTHYS (Swainson).§

SERIOLA Cuv. (nec Gaertner).

The name *Zonichthys* was proposed by Swainson for the *Scomber fasciatus*

* One from Honolulu, one of the Sandwich Islands, sent to the Smithsonian Institution by the Rev. W. H. Pease. It is rather shorter than the European one.

† By analogy, the Sandwich Island specimen being smaller, the height of the body should be greater, and the teeth more developed than in the European one.

‡ The Mediterranean specimen of *Naucrates ductor* from the Bonaparte collection, received from the Academy of Natural Sciences, has the same yellow color as the nominal *N. noveboracensis*.

§ This genus does not embrace the *Seriola gigas* of Gunther (nec Poey) which is distinguished by the eight dorsal spines, shorter second dorsal fin and subrhomboidal patch of vomerine teeth. It may be called *Naucratopsis gigas*. Another allied genus is the *Elogatis* of Bennett, which is also the *Seriolichthys* of Bleeker, *Decoptus* of Poey, and finally *Irex* of Valenciennes.

of Bloch, and as that of *Seriola* had been previously accepted for a genus of plants, the former may be retained for the homonymous genus of Ichthyology. Like so many other genera proposed in the miserable work of Swainson, the *Zonichthys* of that author is founded on one of Bloch's figures, and is simply the result of a misapprehension.

The species of *Zonichthys* appear to be subject to considerable variations. The bands become less distinct, or even obsolete with age, the ventrals are abbreviated, and the height seems to even decrease. The validity of the *Zonichthys boscii* and *Z. carolinensis* is therefore not quite certain. The former has not been seen by me. The following synopsis displays the apparent differences of the several species :

- I. Head rather higher than long, with the profile boldly de-curved..... *Z. fasciatus*.
- II. Head longer than high..... *HALATRACTUS*.
 - α. D. VII. I. 31. A. II. I. 20. Body efasciate..... *Z. boscii*.
 - β. D. VII. I. 32-34. A. II. I. 19-20. Body with 6 bands, 3 ascending on dorsal and 2 on anal... .. *Z. zonatus*.
 - γ. D. VII. I. 36, 37. A. II. I. 19-20. Body efasciate.. *Z. carolinensis*.

ZONICHTHYS FASCIATUS, Swainson.

Scomber fasciatus Bloch.

Seriola fasciata Cuv. et Val.

I have never seen a specimen of this species, unless a large one, without bands, may be an aged form of it.

The *Zonichthys fasciatus* is probably the only species of the United States which truly belongs to this genus. The other species referred to it are distinguished by the subfusiform shape and the elongation of the head and doubtless belong to another genus which may be called *Halatractus*, the type of which may be found in the *Zonichthys zonatus*, a congener of *Seriola dumerilii*.

HALATRACTUS Gill.

HALATRACTUS BOSCH Gill.

Seriola boscii Cuv. et Val.

Some of the specimens of *Zonichthys* in the Smithsonian collection appear to be referrible to this species, which was first discovered at Charleston by the naturalist to whom it has been dedicated.

HALATRACTUS ZONATUS Gill.

Scomber zonatus Mitchill.

Seriola zonata Cuv. et Val.

Seriola leiarchus Cuv. et Val.

Günther appears to be correct in his union of the *Seriola zonata* and *S. leiarchus* of the *Histoire Naturelle des Poissons*. The species ranges from New York southwards. A specimen between six and seven inches long, the tips of whose ventral fins cover the anus appears to represent a younger stage of this species. It was obtained at Charleston.

HALATRACTUS CAROLINENSIS Gill.

Seriola carolinensis Holbrook.

Seriola zonata Günther.

This species appears to differ from the foregoing by the less height of the body and the more numerous rays of the second dorsal and anal fins, as well perhaps as by the color. The latter, however, is perhaps due to age.

[Sept.

Subfamily *POMATOMINÆ* Gill.Genus *POMATOMUS*, Lacépède.*Gonenion Raf.**Temnodon Cuv. et Val.**POMATOMUS SALTATRIX* Gill.*Gasterosteus saltatrix Linn.**Scomber saltator Bloch.**Cheilodipterus heptacanthus Lac.**Pomatomus skib Lac.**Gonenion serra Raf.**Scomber plumbeus Mitchill.**Temnodon heptacanthus Quoy and Gaimard.**Temnodon saltator Cuv. et Val.*

This species is very abundant along the entire eastern coast of the United States.

Description of a new generic type of **MORMYROIDS** and Note on
the arrangement of the genus.

BY THEODORE GILL.

The Mormyroids now known appear to be distributable among two sub-families and eight genera which may be briefly distinguished by the following characters :

- I. Dorsal very long, commencing in front of ventrals. Anal very short.
 Vomer covered by anterior processes of palatine bones.
 Cerebellum entirely concealed above..... *MORMYRINÆ*.
 Muzzle tubuliform..... *Mormyrus*.
 Muzzle obtuse..... *Mormyroides*.
- II. Dorsal commencing more or less behind the ventrals.
 Anal oblong or elongated. Vomer uncovered. Cerebellum and quadrigeminal bodies more or less exposed..... *PETROCEPHALINÆ*.
 A. Mouth considerably in advance of the eyes.
 1. Anal rather shorter than dorsal..... *Isichthys*.
 2. Anal less than twice as long as dorsal (D. 17-26. A. 25-50).
 α . Lower jaw without flap or barbel. Upper jaw longer *Marcusenius*.
 Lower jaw prominent..... *Mormyrops*.
 β . Lower jaw with a conical flap or barbel..... *Gnathonemus*.
 3. Anal three times as long as dorsal. Palatal teeth pisiform..... *Hyperopisus*.
 AA. Snout produced. Mouth under eyes..... *Petrocephalus*.

MORMYRINÆ Gill.*MORMYRUS* Linn.*Scrophicephalus Sw.**Mormyrus caschive Hass.**MORMYRODES* Gill.*Mormyroides hasselquistii* = *Mormyrus hasselquistii Geoffroy*.*PETROCEPHALINÆ* Gill.*ISICHTHYS* Gill.*Isichthys henryi Gill.*

1862.]